UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 6518

MILL AVENUE (CSAH 3)

OVER THE

MISSISSIPPI RIVER

DISTRICT 3 – CROW WING COUNTY

OCTOBER 23, 2012

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 7423

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 6518, Piers 1, and 2, were found to be in satisfactory condition with no defects of structural significance and no appreciable changes since the last underwater inspection. Piers 1 and 2 exhibited moderate to heavy concrete scaling and corrosion on the ice breakers. Piers 1 and 2 also exhibited footing/seal exposure with 3 feet maximum vertical exposure at Pier 2 and up to 2.5 feet of vertical seal exposure at Pier 1. The channel bottom material consisted of silt, sand, and cobbles allowing 4 inches of probe rod penetration.

INSPECTION FINDINGS:

(A) There was footing exposure at both piers with a maximum vertical footing exposure of 3.5 feet and a maximum seal exposure (only present at Pier 1) of 2.5 feet. At Pier 1, the maximum seal exposure was located at the middle of the north side. At Pier 2, the 3 feet maximum footing exposure was located at the southeast corner.

(B) There were logs up to 18-inch-diameter with associated branchy drift located at the downstream nose of Pier 2 extending from the channel bottom up 4 feet, and measuring approximately 10 feet long and 10 feet wide.

(A) There was moderate to heavy concrete scaling on both piers, typically from 6 inches above to 3 feet below the waterline with maximum penetration of 6 inches at the noses. Typical penetrations were up to 2 inches.

(B) Spalls with 2 to 4 inches of penetration and exposed reinforcing steel were observed on the south face of Pier 2 from 6 feet above to 8 feet above the waterline.

(C) Above and below the scaling, the concrete of the pier faces and footings (where exposed) was typically smooth and sound with random minor areas of poor consolidation with up to 1/2 inch maximum penetration and random vertical hairline cracks extending from the top of pier to the channel bottom.

(D) The steel ice breakers located at the upstream nose of both piers from 4 feet above to 6 inches below the waterline exhibited loss of coating and minor surface corrosion with no appreciable loss of section.

(E) The channel bottom material typically consisted of sand and cobbles up to 6 inches in diameter allowing up to 4 inches of probe rod penetration

RECOMMENDATIONS:

(A) Due to the presence of the piles under the footing, the extent of foundation exposure is not presently a significant concern and should only be monitored during subsequent inspections.

(B) Repair the spalls at Pier 2 by removing all unsound concrete, cleaning the reinforcing steel, and patching with a concrete mix designed to promote high durability and low permeability.

(C) The accumulation of timber debris at Pier 2 should be monitored during future underwater inspections, and if found to be progressing, removal measures may be warranted at that time.

(D) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months, and continue to monitor the extent of footing exposure at all piers.

Respectfully submitted,

Inspection Team Leader:
WSB and Associates

Barritt Lovelace
Registered Professional Engineer
Bridge Safety Inspection Team Leader

PROFESSIONAL ENGINEER
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.
Daniel G. Stromberg
Date 6/30/14 License # 21491

COLLINS ENGINEERS, INC.

Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 6518

Feature Crossed: Mississippi River

Feature Carried: Mill Avenue (CSAH 3)

Location: District 3 – Crow Wing County

Bridge Description: The superstructure consists of three spans of steel beams. The superstructure is supported by two reinforced concrete abutments and two reinforced concrete piers. The piers are numbered 1 through 3 starting from the south.

2. INSPECTION DATA

Professional Engineer/Team Leader: Barritt R. Lovelace, P.E. (WSB)

Dive Team: Lukas Janulis P.E., Marc B. Parker

Date: October 23, 2012

Weather Conditions: Light Rain, 60°F

Underwater Visibility: 2.0 feet

Waterway Velocity: 1.0 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1and 2.

General Shape: The piers each consist of two rectangular reinforced concrete columns connected by a diaphragm wall, all of which supported on a common rectangular footing/seal founded on piles.

Maximum Water Depth at Substructure Inspected: Approximately 28.3 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at upstream end of Pier 1.

Water Surface: The waterline was approximately 9.8 feet below reference
Water Elevation = 1182.4.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 6

Item 61: Channel and Channel Protection: Code 6

Item 92B: Underwater Inspection: Code B/10/12

Item 113: Scour Critical Bridges: Code I

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

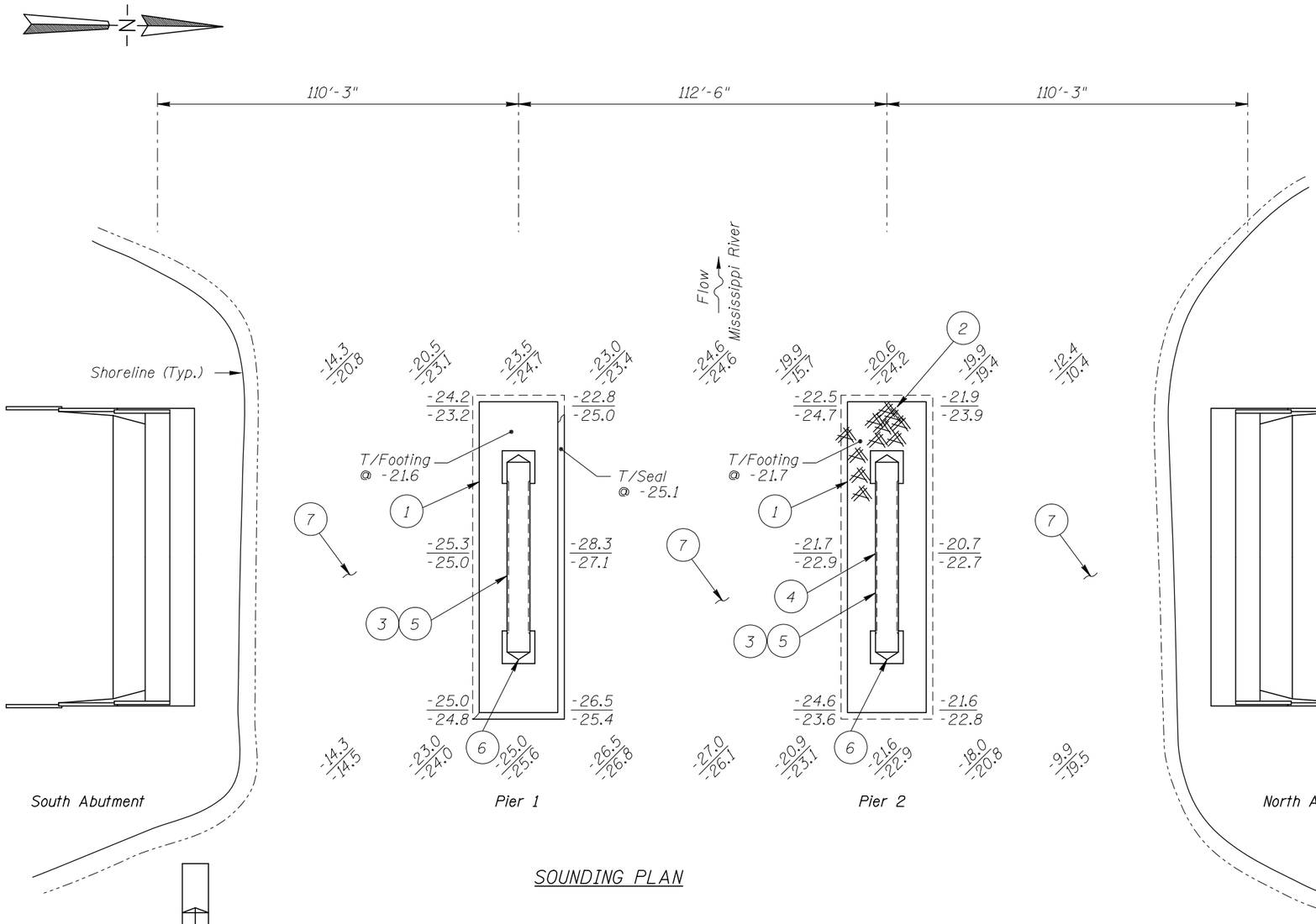
_____Yes X No

6. STRUCTURAL ELEMENT CONDITION RATING

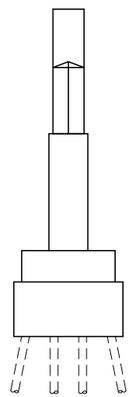
Item #	Element Description	Quantity	Unit	Conditions				
				1	2	3	4	5
210	Reinforced Concrete Pier Wall	79	LF		79			
220	Concrete Footing	2	EA	2				
985	Slopes & Slope Protection	1	EA	1				

Photograph 1. View of Pier 1, Looking Southwest.

Photograph 2. View of Pier 2, Looking Northwest.



SOUNDING PLAN



TYPICAL END VIEW OF PIERS

GENERAL NOTES:

1. Piers 1 and 2 were inspected underwater.
2. At the time of inspection on October 23, 2012, the waterline was located approximately 9.8 feet below the top of the pier cap at the upstream end of Pier 1. This corresponds with a waterline elevation of 1182.4 feet based on previous report dated September 11, 2000.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.
5. The inspection notes shown on this drawing represent either new or previously noted conditions of structural significance or previously noted conditions that have changed significantly. For additional conditions not noted herein, refer to the 2000 report.

INSPECTION NOTES:

1. There was footing exposure at both piers with a maximum vertical footing exposure of 3.5 feet and a maximum seal exposure (only present at Pier 1) of 2.5 feet. At Pier 1, the maximum seal exposure was located at the middle of the north side. At Pier 2, the 3 feet maximum footing exposure was located at the southeast corner.
2. There were logs up to 18-inch-diameter with associated branchy drift at the downstream nose of Pier 2 extending from the channel bottom up 4 feet, approximately 10 feet long and 10 feet wide.
3. There was moderate to heavy concrete scaling on both piers, typically from 6 inches above to 3 feet below the waterline with maximum penetration of 6 inches at the noses. Typical penetrations were up to 2 inches.
4. Spalls with 2 to 4 inches of penetration and exposed reinforcing steel were observed on the south face of Pier 2 from 6 feet above to 8 feet above the waterline.
5. Apart from the above mentioned scaling and spalls, the concrete of the pier faces and footings (where exposed) was typically smooth and sound with random minor areas of poor consolidation with up to 1/2 inch maximum penetration and random vertical hairline cracks from top of pier to channel bottom.
6. The steel ice breakers located at the upstream nose of both piers from 4 feet above the waterline to 6 inches below the waterline exhibited loss of coating and minor surface corrosion with no appreciable loss of section.
7. The channel bottom material consisted of sand and cobbles up to 6 inches in diameter allowing up to 4 inches of probe rod penetration.

Legend

-5.2	Sounding Depth (10/23/12)
-5.2	Sounding Depth (8/16/07)
	Timber Debris

Note:

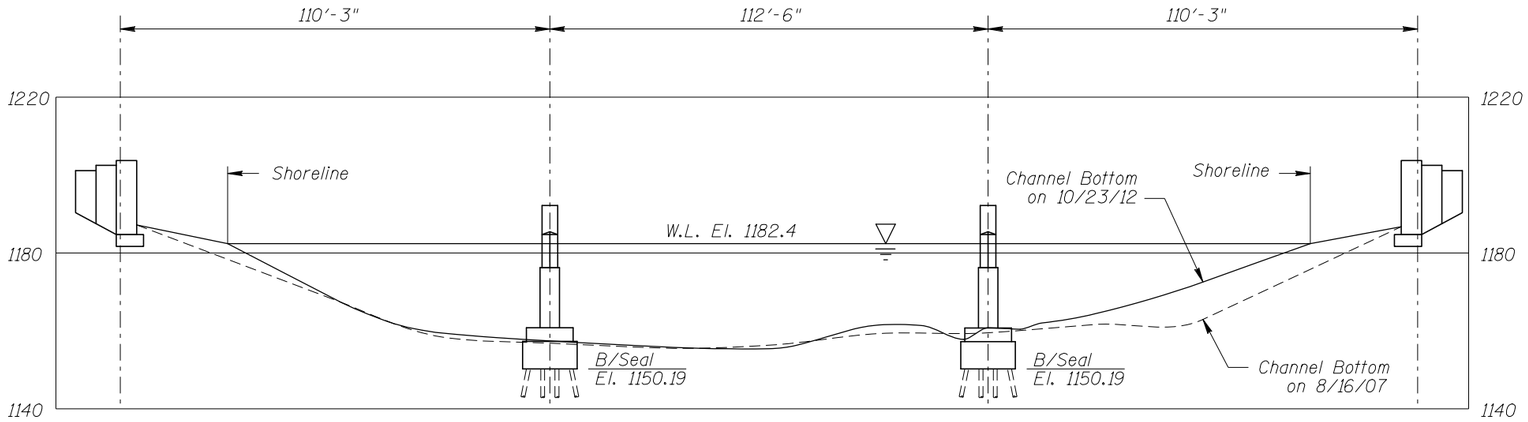
All soundings based on 2012 waterline location.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

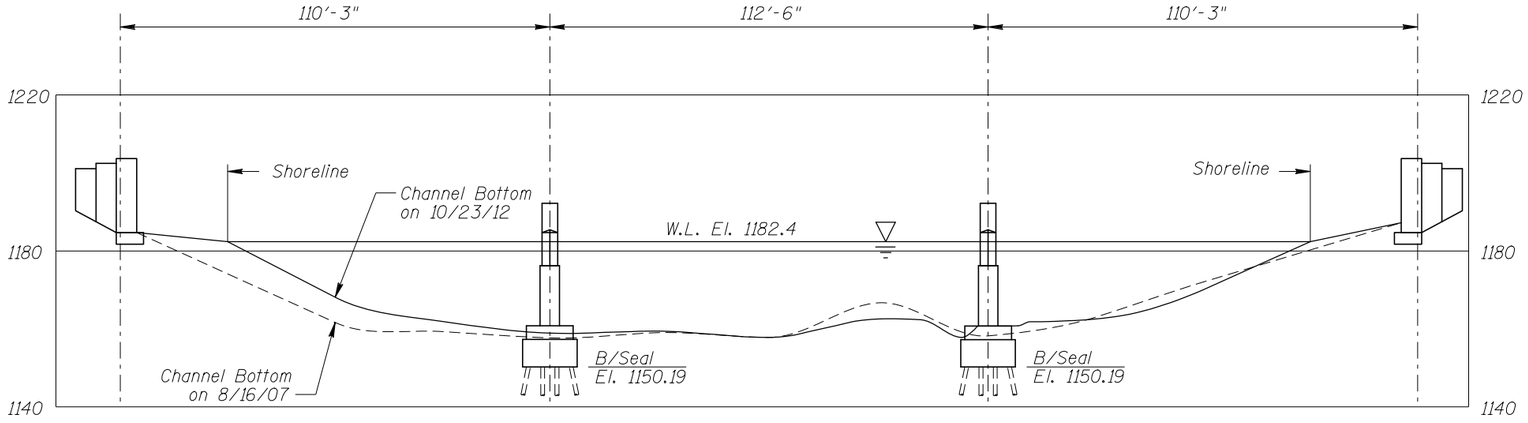
STRUCTURE NO. 6518
OVER THE MISSISSIPPI RIVER
DISTRICT 3, CROW WING COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: CRE	COLLINS ENGINEERS, INC. 123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: OCT., 2012
Checked By: LJ		Scale: NTS
Code: 74236518		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
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UNDERWATER BRIDGE INSPECTION

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DISTRICT 3, CROW WING COUNTY

NORTH AND SOUTH
FASCIA PROFILES

Drawn By: CRE	COLLINS ENGINEERS INC 123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: OCT., 2012
Checked By: LJ		Scale: 1/16" =1'
Code: 74236518		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: October 23, 2012

ON-SITE TEAM LEADER: Barritt R. Lovelace, P.E. (WSB)

BRIDGE NO: 6518 WEATHER: Light Rain, 60°F

WATERWAY CROSSED: Mississippi River

DIVING OPERATION: X SCUBA _____ SURFACE SUPPLIED AIR

_____ OTHER _____

PERSONNEL: Lukas Janulis, Marc B. Parker

EQUIPMENT: Commercial SCUBA, U/W Light, Scraper, Lead Line, Sounding Pole, Fathometer, Probe Rod, Camera, 20ft boat.

TIME IN WATER: 4:30 P.M.

TIME OUT OF WATER: 5:00 P.M.

WATERWAY DATA: VELOCITY 1.0 ft/sec

VISIBILITY 2.0 feet

DEPTH 28.3 feet maximum at Pier 1

ELEMENTS INSPECTED: Piers 1 and 2

REMARKS: Overall, Piers 1, and 2 were found to be in satisfactory condition with no defects of structural significance and no appreciable changes since the last underwater inspection. Piers 1 and 2 exhibited moderate to heavy concrete scaling and corrosion on the ice breakers. Piers 1 and 2 also exhibited footing/seal exposure with 3 feet maximum vertical exposure at Pier 2 and up to 2.5 feet of vertical seal exposure at Pier 1. The channel bottom material consisted of silt, sand, and cobbles allowing 4 inches of probe rod penetration.

FURTHER ACTION NEEDED: ___X____ YES _____ NO

Due to the presence of the piles under the footing, the extent of foundation exposure is not presently a concern and should only be monitored during subsequent inspections.

Repair the spalls at Pier 2 by removing all unsound concrete, cleaning the reinforcing steel, and patching with a concrete mix designed to promote high durability and low permeability.

The accumulation of timber debris at Pier 2 should be monitored during future underwater inspections, and if found to be progressing, removal measures may be warranted at that time.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months, and continue to monitor the extent of footing exposure at all piers.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 6518
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER. Barritt Lovelace, P.E.
WATERWAY CROSSED Mississippi River

INSPECTION DATE October 23, 2012

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	28.3’	N	6	6	8	N	6	6	7	7	N	6	6	N	N	N	N	N
	Pier 2	24.6’	N	6	6	8	N	6	6	7	7	7	6	6	N	N	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, Piers 1, and 2 were found to be in satisfactory condition with no defects of structural significance and no appreciable changes since the last underwater inspection. Piers 1 and 2 exhibited moderate to heavy concrete scaling and corrosion on the ice breakers. Piers 1 and 2 also exhibited footing/seal exposure with 3 feet maximum vertical exposure at Pier 2 and up to 2.5 feet of vertical seal exposure at Pier 1. The channel bottom material consisted of silt, sand, and cobbles allowing 4 inches of probe rod penetration.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.